

REMARKS

Applicants request favorable reconsideration and allowance of the subject application in view of the preceding amendments and the following remarks.

Claims 15 and 16 are presented for consideration. Each of claims 15 and 16 is independent. Claim 15 has been amended to clarify features of the subject invention. Support for these changes can be found in the original application, as filed. For example, the Examiner's attention is directed to the original disclosure of the subject application, for example, in PCT International Application Publication No. WO 2005/001569 A1, page 18, lines 13-15, page 19, lines 5-9, page 21, lines 2-7, page 22, lines 19-22, and page 41, lines 5-8. Accordingly, no new matter has been added.

Applicants request favorable reconsideration and withdrawal of the rejection set forth in the above-noted Office Action.

Claims 15 and 16 were rejected under 35 U.S.C. § 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as being unpatentable over the Alkaisi article.

Applicants submit that the cited art does not teach or suggest many features of the present invention, as previously recited in these claims. Therefore, this rejection is respectfully traversed. Nevertheless, Applicants submit that independent claims 15 and 16, for example, as presented, amplify the distinctions between the present invention and the cited art.

In one aspect of the present invention, independent claim 15 recites a method of designing an exposure mask with a light blocking member for exposing an image forming layer provided on a substrate to near field light leaking from adjoining openings formed in the light blocking member. The method includes determining a width D of the openings and an opening

interval of the openings to be formed in the light blocking member, in which a relation $D \leq (P - W - 2T)$ is satisfied, where T is the height of a pattern to be produced by exposure and development prior to processing the substrate using the image forming layer, W is the linewidth of the pattern to be produced by exposure and development prior to processing the substrate, and P is the pitch of the pattern, so that an electrical field distribution, adjacent to the openings of the light blocking member as exposure light is projected on the light blocking member, is approximated to an electrical field model extending circularly concentric with an edge of the light blocking member at an image forming layer side as a center.

In another aspect of the present invention, independent claim 16 recites an exposure method of manufacturing an exposure mask with a light blocking member for exposing an image forming layer provided on a substrate to near field light leaking from adjoining openings formed in the blocking member. The method includes determining a width D of the openings and an opening interval of the openings to be formed in the light blocking member, and processing the light blocking member so as to obtain the width D and the opening interval, in which a relation $D \leq (P - W - 2T)$ is satisfied, where T is the height of a pattern to be produced by exposure and development using the image forming layer, W is the linewidth of the pattern and P is the pitch of the pattern, so that an electrical field distribution, adjacent to the openings of the light blocking member as exposure light is projected on the light blocking member, is approximated to an electrical field model extending circularly concentric with an edge of the light blocking member at an image forming layer side as a center.

In accordance with Applicants' present invention, as recited in independent claims 15 and 16, an exposure mask is designed so that an electrical field distribution, adjacent to openings of a light blocking member as exposure light is projected on the light blocking member, is

approximated to an electrical field model extending circularly concentric with an edge of the light blocking member at an image forming layer side as a center.

Applicants submit that the cited art does not teach or suggest such features of the present invention, as recited in the independent claims.

The Examiner takes the position that the Alkaisi article teaches a concentric model (contour plots of a normalized electrical-field intensity, as shown in FIG. 11 of the Alkaisi article). This contention is respectfully traversed. Rather, Applicants submit that FIG. 11 of the Alkaisi article does not at all teach or suggest a concentric model approximation. In this regard, FIG. 11 of the Alkaisi article does not show any clear or delineated boundary of an electrical field. Applicants submit, therefore, that one having ordinary skill in the art would not understand, from FIG. 11 of the Alkaisi article, a concept of “an electrical field model extending circularly concentric with an edge of a light blocking member at an image forming layer side as a center.”

Since FIG. 11 of the Alkaisi article is unclear, and does not teach or suggest anything about a concentric model approximation, Applicants submit that it would be unreasonable to construe FIG. 11 of the Alkaisi article as suggesting a concentric model. Rather, Applicants submit that a concentric model approximation was first proposed by the inventors of the subject invention, as recited in independent claims 15 and 16.

Still further, the Examiner takes the position that the Alkaisi article, on pages 880 to 881, teaches $T = 60$, $W = 50$, $P = 280$ and $D = 70$, which are said to satisfy the conditional expression of Applicants' invention, as recited in independent claims 15 and 16. Again, this contention is respectfully traversed. As discussed above, the Alkaisi article does not teach or suggest any

concept of a concentric model approximation. Therefore, that article likewise does not teach or suggest anything about the conditional expression of Applicants' present invention, as recited in independent claims 15 and 16. Therefore, even, assuming *arguendo*, that numerical values extracted from the Alkaisi article satisfy the conditional expression of Applicants' invention, as recited in independent claims 15 and 16, that alone does not mean that the Alkaisi article teaches the conditional expression *per se*.

Nevertheless, to further amplify the distinctions between certain aspects of Applicants' invention and the teachings of the Alkaisi article, Applicants have amended independent claim 15 to clarify that the values for T and W are values after exposure and development, but before processing of the substrate. To the contrary, the Alkaisi article, on page 880, in the fourth paragraph, discusses that the patterns have been dry-etched approximately 100 nm deep into silicon to facilitate imaging, and, after exposure, development, and dry-etching, the width has been reduced to be less than 50 nm. Applicants submit, therefore, that it is clear from this discussion that the value of $W = 50$ in the Alkaisi article concerns a value after processing (that is, dry-etching) of the substrate. In marked contrast, in Applicants' invention, as recited in independent claim 15, as discussed above, the values for T and W are those after exposure and development, but before processing of the substrate. Applicants submit, therefore, that the present invention, as recited in independent claim 15, is clearly distinguished from the teachings of the Alkaisi article on this point as well.


For the reasons noted above, Applicants submit that the Alkaisi article does not teach or suggest many features of Applicants' present invention, as recited in independent claims 15 and 16. Applicants submit, therefore, that the Alkaisi article should not be read to anticipate or render obvious Applicants' present invention, as recited in those independent claims.

For the foregoing reasons, Applicants submit that the present invention, as recited in independent claims 15 and 16, is patentably defined over the cited art.

Applicants submit that the instant application is in condition for allowance. Applicants request favorable reconsideration, withdrawal of the rejection set forth in the above-noted Office Action and an early Notice of Allowance.

Applicants' undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should be directed to our address listed below.

Respectfully submitted,



Attorney for Applicants
Steven E. Warner
Registration No. 33,326

FITZPATRICK, CELLA, HARPER & SCINTO
1290 Avenue of the Americas
New York, New York 10104-3800
Facsimile: (212) 218-2200
SEW/eab
FCHS_WS 4162573_1